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| 09/775,920 | 02/02/2001 | James J. Alwan | 100.718.419 (MIC- 77US) | 8909 |
| 24247 | 7590 | 06/27/2006 | EXAMINER | |
| TRASK BRITT P.O. BOX 2550 SALT LAKE CITY, UT 84110 | | | MACCHIAROLO, PETER J | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2879 | |

DATE MAILED: 06/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/775,920

Applicant(s)

ALWAN, JAMES J.

Examiner

Peter J. Macchiarolo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 13-26 and 33-45 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 13-26 and 33-45 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05/15/2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application on 06/02/2006. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 05/15/2006 is acknowledged, which amends the specification and claims, and adds new figures 4 and 5. However, pending claims 13-26, and 33-45 are not allowable as explained below. An action on the RCE follows.

Drawings

The amendments to drawings filed 05/15/2006 are objected to because they add new figures 4 and 5, however, there is already a figure labeled "figure 4," filed 05/07/2004. The new figures should be labeled figures 5 and 6. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet

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submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

The amendments to the specification filed on 06/02/2006 have been entered and considered. However, the specification is objected to because of the following informalities: The amended specification does not have a brief description of the newly submitted figures. Appropriate correction is required.

Claim Objections

Claims 16, 19, and 24 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The claims recite, "spraying a wet etchant on the structure without spraying the etchant elsewhere." This is contradictory to the parent claims and therefore does not further limit these claims.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 13-21, 24, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Admitted Prior Art (AAPA) in view of previously cited Yamasaki et al (USPN 6683007; "Yamasaki") in further view of previously cited Potter (USPN 5700176; "Potter").

Regarding claims 13-21, 24, and 39 the previous rejection (09/02/2005) discussed that Applicant admits the prior art includes a method of forming an FED comprising providing a substrate having a central area and a peripheral area, forming alignment marks and bond pads on the peripheral area of the substrate, forming an emitter electrode structure on the central area of the substrate, forming a plurality of micropoints in groups on the emitter electrode structure, depositing an insulating layer over the substrate, emitter electrode structure, and plurality of micropoints, and depositing a conductive layer over the insulating layer. Applicant further admits it is known that selectively etching openings through the conductive and insulating layers comprises applying a layer of photoresist on said conductive layer, imaging said photoresist to define a pattern for said openings, developing the photoresist, and etching the pattern for the openings. The Examiner further notes that the prosecution history has shown this to be a well-known method of manufacture.

Applicant further admits a method of making a semiconductor wafer to clear alignment marks by locally applying a wet etchant to uncover a structure is known in the art to effectively clear the marks without the use of photolithography (page 4, paragraph 2). Yamasaki also supports this teaching in column 3 lines 50-64, that using a wet etchant to uncover a structure allows for good controllability without damaging the device area. Yamasaki further shows this method requires moving an etchant dispenser or the cathode assembly relative to one another during the applying while selectively spraying a wet etchant on a structure (column 4 lines 15-30).

Yamasaki and AAPA are silent to using this method to manufacture an FED, or to the exact distance away from the alignment mark structure the etchant is applied.

However, Potter teaches in the abstract and in column 1 lines 23-29 that processes used for manufacturing FED's use processes and equipment similar to those used for semiconductor fabrication, which allows a wide range of materials with less stringent controls of material purity. Further, Potter shows in figure 1, a cathode (100) and an anode (70) assembly assembled together in a FED, which can be automatically aligned, or aligned according to the well-known prior art method i.e. with alignment marks. Potter further teaches contact pads are selectively provided at the device top surface to make electrical contact, which may require the same clearing method as described in Yamasaki.

Further, Yamasaki and AAPA both infer applying etchant within 200 microns of the alignment mark structure since both Yamasaki and AAPA disclose the etchant is used to uncover the structure. One of ordinary skill in the art will immediately recognize in order to uncover the structure with a wet etchant, it must be applied directly on top of the structure to effectively

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uncover it, the distance then being zero microns, thereby falling into the claimed range of 200 microns.

Even if, arguendo, Yamasaki or AAPA did not infer this exact distance, this is a matter of obvious design choice, since Applicant has not adequately disclosed any testing or analytical data which establishes criticality for these modifications, or recites any specific advantage the invention benefits from over the prior art from this modification. Further, one would arrive at this distance for a variety of reasons, such as to effectively clear the structure while reducing the time and cost of the manufacturing processes.

Therefore, in view of the above discussion, it would have been obvious to one having ordinary skill in the art at the time the invention was made to construct an FED with the method of AAPA and Yamasaki with the etchant being applied within 200 microns of the structure to allow for less pure materials and cheaper manufacturing method.

As discussed in the previous rejection, Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

Claims 13-26, and 33-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in view of previously cited Fishkin et al (USPN 6202658; "Fishkin") in further view of Potter.

Regarding claims 13-21, 24, and 39, AAPA discloses a method of forming an FED comprising providing a substrate having a central area and a peripheral area, forming alignment marks and bond pads on the peripheral area of the substrate, forming an emitter electrode

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structure on the central area of the substrate, forming a plurality of micropoints in groups on the emitter electrode structure, depositing an insulating layer over the substrate, emitter electrode structure, and plurality of micropoints, and depositing a conductive layer over the insulating layer. Applicant further admits it is known that selectively etching openings through the conductive and insulating layers comprises applying a layer of photoresist on said conductive layer, imaging said photoresist to define a pattern for said openings, developing the photoresist, and etching the pattern for the openings. The Examiner further notes that the prosecution history has shown this to be a well-known method of manufacture.

Applicant further admits a method of making a semiconductor wafer to clear alignment marks by locally applying a wet etchant to uncover a structure is known in the art to effectively clear the marks without the use of photolithography (page 4, paragraph 2). Fishkin also supports this teaching in column 3 lines 50-64, that using a wet etchant to uncover a structure allows for good controllability without damaging the device area, and further teaches this method requires moving an etchant dispenser or the cathode assembly relative to one another during the applying while selectively spraying a wet etchant on a structure (abstract and column 2 line 47 to column 3, line 9).

Fishkin and AAPA are silent to using this method to manufacture an FED, or to the exact distance away from the alignment mark structure the etchant is applied.

However, Potter teaches in the abstract and in column 1 lines 23-29 that processes used to manufacture FED's utilize processes and equipment similar to those used for semiconductor fabrication, which allows a wide range of materials with less stringent controls of material purity. Further, Potter shows in figure 1, a cathode (100) and an anode (70) assembly assembled

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together in a FED, which can be automatically aligned, or aligned according to the well-known prior art method i.e. with alignment marks. Potter further teaches contact pads are selectively provided at the device top surface to make electrical contact, which may require the same clearing method as described in Fishkin.

Further, Yamasaki and AAPA both infer applying etchant within 200 microns of the alignment mark structure since both Yamasaki and AAPA disclose the etchant is used to uncover the structure. One of ordinary skill in the art will immediately recognize in order to uncover the structure with a wet etchant, it must be applied directly on top of the structure to effectively uncover it, the distance then being zero microns, thereby falling into the claimed range of 200 microns.

Even if, arguendo, Yamasaki or AAPA did not infer this exact distance, this is a matter of obvious design choice, since Applicant has not adequately disclosed any testing or analytical data which establishes criticality for these modifications, or recites any specific advantage the invention benefits from over the prior art from this modification. Further, one would arrive at this distance for a variety of reasons, such as to effectively clear the structure while reducing the time and cost of the manufacturing processes.

Therefore, in view of the above discussion, it would have been obvious to one having ordinary skill in the art at the time the invention was made to construct an FED with the method of AAPA and Fishkin with the etchant being applied within 200 microns of the structure to allow for less pure materials and cheaper manufacturing method.

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Regarding claims 22, and 23, Applicant admits the prior art includes a method of forming a cathode assembly of a field emission device comprising polishing the conductive layer via chemical-mechanical planarization. The Examiner further notes that the prosecution history has shown this to be a well known method of manufacture.

Regarding claim 25, most of the limitations herein have been previously discussed above, with the exception of forming a plurality of micropoints on the emitter electrode structure, depositing an insulating layer over the substrate, emitter electrode structure, and a plurality of micropoints; with walls defining the openings being spaced away from the micropoints. Not only does Potter teach this configuration, this is a well-known configuration of an FED. The reasons for combining and motivation are the same as for rejected claim 13 above.

Regarding claim 26, 33, 34, 37, 38, and 42-45 the limitations herein have been discussed at rejected claims 13 and 16 above and will not be repeated here. The reasons for combining and motivation are the same as for claim 13.

Regarding claim 35, 40, Fishkin shows in figure 5 applying the etchant on the periphery in elongated spray zones.

Regarding claims 36, and 41, Fishkin shows applying an etchant from a nozzle in the etchant dispenser while moving the nozzle over the device, but is silent to moving the nozzle linearly.

However, this is an obvious modification if the bond pads are in a linear configuration, as in an FED of Potter. The motivation and reasons for combining are the same as for claim 13.

Response to Arguments

Applicant's arguments filed 05/15/2006 have been fully considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Peter J Macchiarolo whose telephone number is (571) 272-2375. The examiner can normally be reached on 8:30 - 5:00, M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimeshkumar Patel can be reached on (571) 272-2475. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).




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PRIMARY EXAMINER